

STUDIES OF THE COASTAL MARINE FAUNA OF SOUTHERN SINALOA, MEXICO. IV. REPORT ON THE CARIDEAN CRUSTACEANS

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Abstract.—As a result of a large scale survey of the coastal marine fauna of southern Sinaloa, Mexico, 29 species of caridean shrimps are reported for a wide variety of habitats. Information is provided on their currently known distribution in the Eastern Pacific region.

Since 1979, a large scale survey of the marine coastal fauna has been underway in the southeastern part of the Gulf of California. One of the main results obtained so far is the updating of a provisional inventory of the species of marine and estuarine invertebrates and fishes found in southern Sinaloa (van der Heiden and Hendrickx 1982; Hendrickx and van der Heiden in press). Much information also has been gained regarding the occurrence of these species in different habitats.

There have been almost no faunistic studies on invertebrates on a regional basis in the Gulf of California. The most comprehensive works available are those of Parker (1963) and Brusca (1980). Both, however, are incomplete, mentioning only some of the wide variety of species to be found in the area. This paper records the caridean shrimps found so far in southern Sinaloa, and provides information on their habitats. Further studies are underway, however, and additional species may be found to be present in the area, especially in less accessible habitats such as the nearshore rocky subtidal.

Material and methods.—The material on which this study of caridean shrimps is based comes from a wide spectrum of habitats with differing environmental conditions. Specimens from shallow water coastal systems came from estuaries, coastal lagoons, and rocky intertidal habitats. Material from the Bay of Mazatlán was taken during a 2-year sampling program aboard the boat *FC-1* of the Secretaría de Educación Pública in Mazatlán. Specimens from the continental shelf were collected during a three-leg project (SIPCO project) aboard the oceanographic vessel *El Puma* of the Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México. Sampling in shallow water was done by hand collecting, cast nets, trawls, small grabs, or small dredges. Aboard ship, bottom grabs, dredges, beam trawls, or otter trawls were used according to the capabilities of the ships that were available. A map of the sampling areas is given in Fig. 1.

Family Pasiphaeidae

Leptochela serratorbita Bate, 1888

Material.—Bay of Mazatlán, Van Veen grab: 2 males (April 1980), 1 ovigerous female (Jan 1980).

Previous Eastern Pacific records.—Cape San Lucas, Baja California Sur; Topolobampo, Sinaloa (Chace 1937).

Range.—Tropical and warm temperate western Atlantic (Chace 1972), southern Gulf of California.

Habitat.—At Cape San Lucas, 15–30 m on sandy bottom (Chace 1937); in Bay of Mazatlán, 10–27 m on fine sand.

Family Palaemonidae

Palaemon (Palaemon) gracilis (Smith, 1871)

Material.—Caimanero lagoon, cast net, 23 specimens (June 1978; Sept 1978; 4 ovigerous).

Previous Eastern Pacific records.—Nicaragua and Panama (Holthuis 1952b).

Range.—Caimanero lagoon south to Río Lara, southern Panama.

Habitat.—Rivers, streams and coastal waterways throughout its range, in fresh to brackish water (up to 8‰ salinity).

Macrobrachium americanum Bate, 1868

Material.—Río Baluarte, 4 specimens (1979).

Previous Eastern Pacific records.—Numerous records, from Mexico to Peru (Holthuis 1952b).

Range.—Mulege, Baja California Sur to northern Peru (Holthuis 1952a).

Habitat.—Freshwater streams in southern Sinaloa (Río Presidio, Río Baluarte, and Río Quelite).

Macrobrachium digueti (Bouvier, 1895)

Material.—Río Baluarte, 3 specimens (Nov 1978, Aug 1980).

Previous Eastern Pacific records.—Baja California, Mexico; Guatemala, Panama, and Ecuador (Holthuis 1952b); Peru (Méndez 1981).

Range.—Mulege, Baja California Sur; Río Baluarte, Sinaloa south to Río Moche, Peru.

Habitat.—Fresh water.

Macrobrachium occidentale Holthuis, 1950

Material.—Río Baluarte, 2 specimens (Nov 1978).

Previous Eastern Pacific records.—Guatemala, El Salvador and Panama (Holthuis 1952b).

Range.—Río Baluarte, Sinaloa south to Panama.

Habitat.—Specimens from the Río Baluarte were collected in fresh water.

Macrobrachium tenellum (Smith, 1869)

Material.—Huizache-Caimanero lagoon complex, 3 specimens (July 1978); Caimanero lagoon, cast net, 7 ovigerous females (Sept 1978); Estero El Verde, hand net, 3 specimens (July 1979).

Previous Eastern Pacific records.—Numerous records, Mexico to Peru (Holthuis 1952b).

Range.—Mulege, Baja California Sur to northern Peru (Holthuis 1952a).

Habitat.—So far, the species has been reported only in fresh water. The ani-

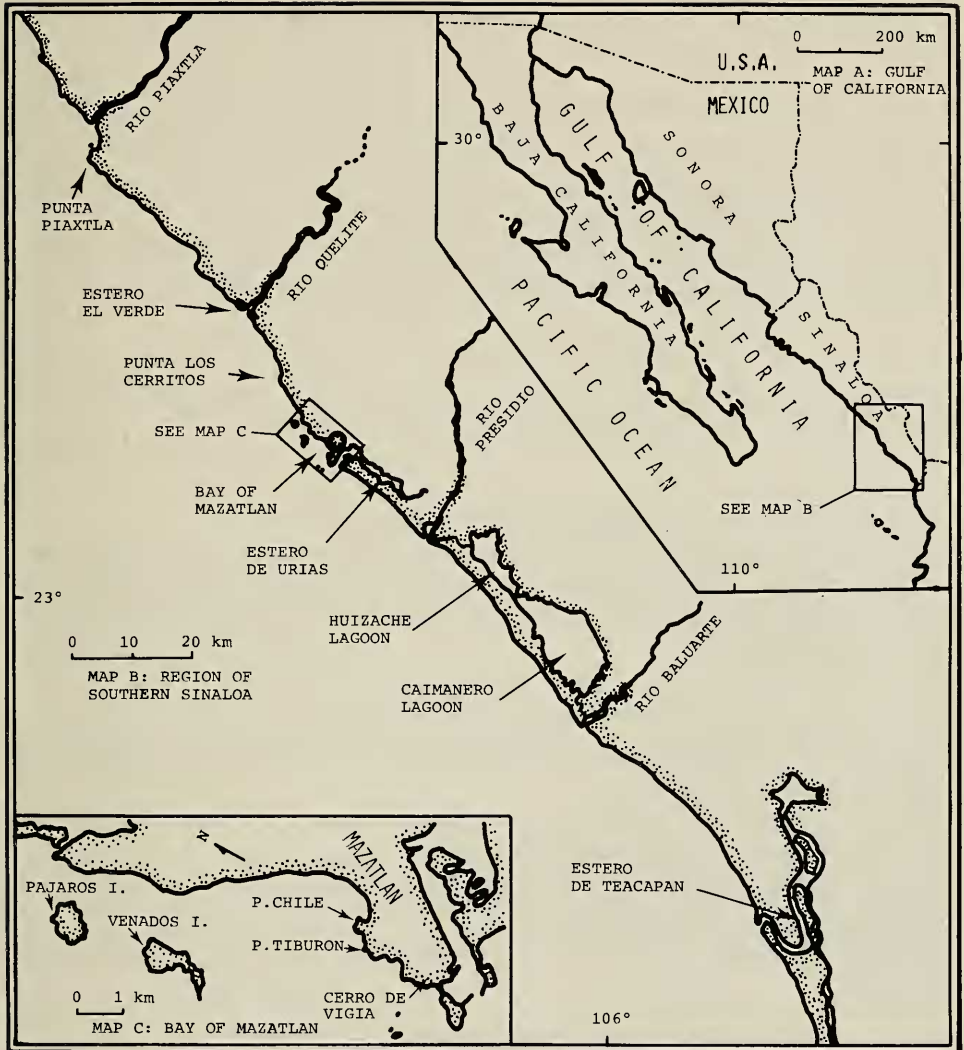


Fig. 1. Location of the sampling areas. Map A: Gulf of California; Map B: Region of Southern Sinaloa; Map C: Bay of Mazatlán.

imals from near Mazatlán, however, were collected in brackish water. The salinity ranged up to 20‰. In Estero El Verde, *M. tenellum* was found in beds of widgeon grass (*Ruppia* sp.).

Palaemonetes (Palaemonetes) hiltoni Schmitt, 1921

Material.—Estero El Verde, 11 specimens, 9 ovigerous (June and Dec 1979; Jan and May 1980); Caimanero lagoon, cast net, 61 specimens (date not recorded).

Previous Eastern Pacific records.—Southern California, U.S.A., Sonora and Sinaloa, Mexico (Holthuis 1952b).

Range.—San Pedro, California south to Sinaloa.

Habitat.—Animals from estero El Verde were taken among widgeon grass (*Ruppia* sp.) with a small hand net at 0.4–1 m at a salinity of 20–22‰.

Periclimenes (Periclimenes) infraspinis (Rathbun, 1902)

Material.—Bay of Mazatlán, Van Veen grab, 3 specimens (Aug 1979).

Previous Eastern Pacific records.—Southern California, U.S.A.; Gulf of California, Costa Rica, Galapagos Islands (Holthuis 1951).

Range.—San Diego, U.S.A., south to the Galapagos Islands (Brusca 1980).

Habitat.—The specimens were taken on a sandy bottom at 9 m.

Neopontonides dentiger Holthuis, 1951

Material.—Bay of Mazatlán, trawl, 1 ovigerous female (Sept 1979); off Punta Piaxtla (23°34'N, 106°57'W), trawl, 1 specimen (Apr 1981).

Previous Eastern Pacific record.—Off Cape San Francisco, Ecuador (Holthuis 1951, 1952a).

Range.—The species is known only from these 3 records.

Habitat.—Holthuis (1951) reported the holotype from a mud-rock bottom at 4 m. Material from Sinaloa was found a sand-rock bottom at 8 m in the Bay of Mazatlán, and on a muddy bottom with colonies of gorgonians attached to stones at 66 m off Punta Piaxtla.

Pontonia margarita Smith, 1869

Material.—Bay of Mazatlán: 1 male and 1 female (Sept 1979), 2 males and 2 ovigerous females (June 1980).

Previous Eastern Pacific records.—Numerous records, from the Gulf of California to the Galapagos Islands (Holthuis 1951).

Range.—From the Gulf of California to the Galapagos Islands, Ecuador (Holthuis 1951).

Habitat.—Specimens were found as commensals of the pearl oyster *Pinctada mazatlanica*.

Family Gnathophyllidae

Gnathophyllum panamense Faxon, 1893

Material.—Punta Los Cerritos, north of Mazatlán, rocky shore, 1 specimen (May 1981).

Previous Eastern Pacific records.—Gulf of California south to Panama (Brusca 1980).

Range.—Gulf of California south to the Galapagos Islands (Wicksten in press).

Habitat.—Rocky intertidal zone to 17 m, sometimes found in tidepools.

Family Hippolytidae

Lysmata californica (Stimpson, 1866)

Material.—Bay of Mazatlán, trawled, 3 specimens, 1 ovigerous (Nov 1979).

Previous Eastern Pacific records.—California, U.S.A.; west coast of Baja Cal-

ifornia, Gulf of California, to Panama (Abele and Patton 1976; Brusca 1980; Standing 1981).

Range.—Tomales Bay, California to Panama.

Habitat.—Common in rocky intertidal areas (Brusca 1980). Taken at 9 and 24 m on muddy sand or fine sand off Mazatlán.

Trachycaris restrictus (A. Milne-Edwards, 1878)

Material.—Off Punta Piaxtla, trawled, 1 ovigerous female (Apr 1981).

Previous Eastern Pacific records.—Gulf of California, Panama (Wicksten in press).

Range.—Tropical eastern and western Atlantic (Chace 1972); Gulf of California to Panama.

Habitat.—The specimen from off Punta Piaxtla was taken on a muddy bottom at 66 m.

Thor paschalis (Heller, 1862)

Material.—Bay of Mazatlán, Van Veen grab, 1 specimen (Nov 1979); Pichilingue, Bay of La Paz, Baja California, rocky shore, 3 specimens (Mar 1980).

Previous Eastern Pacific records.—Gulf of California, southwestern Mexico, Panama (Wicksten in press).

Range.—Indo-West Pacific region (Bruce 1976); Gulf of California to Panama.

Habitat.—At La Paz, the animals were found under stones in a rocky intertidal area. The animal from the Bay of Mazatlán was collected on a bottom of stones and shell fragments.

Latreutes antiborealis Holthuis, 1952c

Material.—Bay of Mazatlán, Van Veen grab, 1 specimen (Nov 1980).

Previous Eastern Pacific records.—Numerous records, Gulf of California to Chile (Wicksten and Méndez in press).

Range.—Gulf of California to Chile.

Habitat.—The specimen from the Bay of Mazatlán was collected on fine to very fine sand at 6 m.

Family Processidae

Processa spp.

Material.—Off Teacapán, Sinaloa (22°24'N, 105°54'W), Van Veen grab, 1 ovigerous female (Aug 1980); Bay of Mazatlán, Van Veen grab, 24 specimens from 12 different grab samples (Aug 1979–Mar 1981).

Habitat.—The animal from off Teacapán was taken at 37 m on silty sand; the rest came from 7–25 m on sandy mud to muddy sand, sometimes with shell fragments.

Remarks.—Individuals of this genus are common in the Bay of Mazatlán. Most of these specimens belong to an undescribed species being studied by M. K. Wicksten and M. Méndez. Others have not yet been identified to species.

Family Alpheidae

Synalpheus digueti Coutière, 1909

Material.—Pájaros Island, Bay of Mazatlán, rocky intertidal zone, 1 specimen (Apr 1980); Punta Chile, Bay of Mazatlán, rocky intertidal zone, 3 specimens (Oct 1980).

Previous Eastern Pacific records.—"Lower California" (Coutière 1909); Arena Bank, Gulf of California (Chace 1937); Panama (Abele and Patton 1976); Isla Malpelo, Colombia (Abele 1975).

Range.—Southern Gulf of California to Colombia.

Habitat.—Lower midlittoral to sublittoral zones, among stones or within crevices in rocky intertidal; also associated with sponges in lower intertidal zone.

Synalpheus nobilii Coutière, 1909

Material.—About 5 km N of Mazatlán, 2 specimens (1 ovigerous) (Dec 1979); Punta Chile, Bay of Mazatlán, 1 ovigerous female (Oct 1980); foot of Cerro de Vigía, Bay of Mazatlán, 2 specimens (1 ovigerous) (Oct 1980); Cerro de Vigía, 5 specimens (2 ovigerous) (Nov 1980).

Previous Eastern Pacific records.—Gulf of California (Wicksten in press); Clipperton Island (Chace 1962); Panama (Abele 1976); Isla Malpelo, Colombia (Abele 1975); Ecuador (Coutière 1909); Galapagos Islands (Schmitt 1939).

Range.—Gulf of California to the Galapagos Islands.

Habitat.—All specimens except the female from Punta Chile came from beneath tufts of coralline algae in the lower midlittoral zone of rocky shores.

Synalpheus biunguiculatus (Stimpson, 1860)

Material.—Punta Piaxtla, rocky shore, 2 specimens (1 ovigerous) (Oct 1979); Punta Chile, Bay of Mazatlán, rocky shore, 2 ovigerous females (Oct 1980); foot of Cerro de Vigía, Bay of Mazatlán, 5 specimens (1 ovigerous) (Oct 1980); Estero de Teacapán, 2 specimens (Mar 1980), 4 specimens (Apr 1980), 1 specimen (May 1980).

Previous Eastern Pacific records.—Gulf of California, southwestern Mexico, and Galapagos Islands (Wicksten in press); Clipperton Island (Chace 1962), Panama (Abele 1976), Isla Malpelo, Colombia (Abele 1975).

Range.—Hawaiian Islands (Stimpson 1860; Banner 1953), Gulf of California south to Galapagos Islands.

Habitat.—Specimens from Punta Piaxtla and the Bay of Mazatlán were found under sponges on rocks and under stones. The animals from Estero de Teacapán were collected on oyster racks with *Striostrea iridescens* and barnacles (*Balanus* sp.) at a salinity of 40‰ in March 1980).

Synalpheus apioceros sanjosei Coutière, 1909

Material.—Punta Piaxtla, rocky shore, 1 ovigerous female (Oct 1980); Bay of Mazatlán, 1 specimen (June 1979); Punta Chile, Bay of Mazatlán, rocky shore, 7 specimens (2 ovigerous) (Apr 1980), 1 ovigerous female (Oct 1980); Isla Pájaros, Bay of Mazatlán, rocky shore, 4 specimens (Apr 1980); foot of Cerro de Vigía,

Bay of Mazatlán, rocky shore, 2 specimens (Dec 1980), 2 specimens (1 ovigerous) (Oct 1980), 3 specimens (1 ovigerous) (Nov 1980).

Previous Eastern Pacific records.—Southern Gulf of California (Brusca 1980); Isla San José, Baja California Sur (Coutière 1909).

Range.—Scammon's Lagoon, west coast of Baja California throughout Gulf of California (Wicksten in press).

Habitat.—In the Bay of Mazatlán, one animal was taken in June 1979 among the calcareous tubes of the gregarious polychaete *Filograna implexa* on sand at 9.5 m. All other specimens came from the lower midlittoral zone to the sublittoral fringe on rocky shores, where the species usually is found under sponges attached to stones or in small cavities.

Automate dolichognatha De Man, 1888

Material.—Off coast of Sinaloa (23°10'N, 106°28'W), Van Veen grab, 1 specimen (Apr 1981).

Previous Eastern Pacific records.—Isla Clarion, Panama, Isla Cocos, Colombia, Ecuador, and Galapagos Islands (Wicksten 1981).

Range.—Tropical western Atlantic, tropical Indo-West Pacific region, tropical eastern Pacific from Sinaloa to the Galapagos Islands (Wicksten 1981).

Habitat.—Commonly found in rocky intertidal zones (Wicksten 1981). The specimen from southern Sinaloa was collected by dredging on a silty sand bottom at 28 m.

Automate rugosa Coutière, 1900

Material.—Off Punta Piaxtla, Van Veen grab, 1 specimen (Apr 1981); off Mazatlán, Van Veen grab, 4 specimens (Apr 1981); entrance to Estero de Urías (Mazatlán Harbour), sediment sample, 1 specimen (Apr 1980).

Previous Eastern Pacific records.—Isla Cedros and Turtle Bay, Mexico; Gulf of Panama (Wicksten 1981; Coutière 1909).

Range.—Isla Cedros, west coast of Baja California; Sinaloa, Gulf of California, south to the Gulf of Panama.

Habitat.—Specimens were taken from sediment samples of muddy sand collected at 27–70 m.

Alpheus armillatus H. Milne Edwards, 1837

Material.—Punta Chile, Bay of Mazatlán, rocky shore, 2 specimens (Oct 1980), 1 specimen (Nov 1980); between Punta Chile and Punta Tiburón, Bay of Mazatlán, under stones, 4 specimens (1 ovigerous) (Apr 1980); Estero de Urías, Mazatlán Harbour, 1 specimen (Nov 1981).

Previous Eastern Pacific records.—Widely distributed in the Gulf of California (Wicksten in press).

Range.—Tropical and warm temperature western Atlantic (Chace 1972); Gulf of California.

Habitat.—The species is common in the rocky intertidal zone of the Bay of Mazatlán, where it lives in burrows under stones. Small specimens have been

found under sponges and in small crevices. The species occurs from the lower midlittoral zone to the sublittoral fringe.

Alpheus floridanus Kingsley, 1878

Material.—Bay of Mazatlán, trawl, 1 specimen (Mar 1979), Van Veen grab, 1 specimen (Jan 1980); Off Cerro de Vigía, Bay of Mazatlán, Van Veen grab, 1 ovigerous female (Nov 1980); off Mazatlán (23°04'N, 106°16'W) trawl, 1 specimen (Mar 1981).

Previous Eastern Pacific records.—Bahía Gonzaga, Mexico; Isla Taboga, Panama (Wicksten in press).

Range.—Eastern Atlantic from Guinea to Congo, Gulf of Mexico to Brazil (Chace 1972); Gulf of California, Panama.

Habitat.—The animals were collected at 20–25 m on muddy sand, often with a significant amount of clay. Contrary to what has been reported for the western Atlantic coast, none of the specimens was taken intertidally.

Alpheus leviusculus Dana, 1852

Material.—South of Punta Chile, Bay of Mazatlán, rocky shore, 5 specimens (2 ovigerous) (Feb 1980; Apr 1980); Punta Chile, rocky shore, 3 specimens (Oct 1980).

Previous Eastern Pacific records.—Galapagos Islands (Sivertsen 1933; Hult 1939).

Range.—Wake Island, Canton Island (Banner and Banner 1964); Gulf of California to Colombia (Wicksten in press), Galapagos Islands.

Since the publication of the report of Banner and Banner (1982) on the alpheids of Australia, it may be necessary to consider the specimens from Sinaloa as members of a new subspecies that would be distinct to both *A. l. leviusculus* (Indo-West Pacific region) and *A. l. bouvieri* (Atlantic region).

Habitat.—*Alpheus leviusculus* was collected under stones, among sand, and in gravel in rocky intertidal areas. It commonly burrows in the lower midlittoral zone and sublittoral fringe.

Alpheus cf. *A. malabaricus* Fabricius, 1775

Material.—Estero El Verde (23°25'30"N, 106°33'30"W) bottom dredge, 1 specimen (May 1979); El Tanque Canal, Caímanero Lagoon, cast net at night, 3 specimens (May 1979); Estero de Urias, Mazatlán Harbour, in mud, 2 specimens (Nov 1981).

Previous Eastern Pacific records.—Vicinity of Mazatlán (Wicksten in press).

Range.—The specimens from Mazatlán belong to the *A. malabaricus* complex and their relationship with other members of this complex will be treated in a forthcoming paper (Wicksten in press).

Habitat.—In southern Sinaloa, the species seems to be restricted to coastal lagoons and mangrove channels. The specimens from Estero de Urias were collected in mud, on a small flat bank bordered by mangrove trees at a salinity of 36‰ and a temperature of 31°C. Other specimens were collected on shallow muddy sand bottoms in a lagoon at a salinity of 37‰.

Table 1.—Species of Carideans in Different Habitats

Rivers, estuaries and lagoons:	Offshore soft or mixed bottoms:
<i>Alpheus malabaricus</i>	<i>Alpheus floridanus</i>
<i>Macrobrachium</i> spp.	<i>Automate dolichognatha</i>
<i>Palaemon gracilis</i>	<i>Automate rugosa</i>
<i>Palaemonetes hiltoni</i>	<i>Latreutes antiborealis</i>
Intertidal-subtidal rocky areas:	<i>Leptocheila serratorbita</i>
<i>Alpheus armillatus</i>	<i>Lysmata californica</i>
<i>Alpheus leviusculus</i>	<i>Neopontonides dentiger</i>
<i>Alpheus schmitti</i>	<i>Ogyrides</i> sp.
<i>Gnathophyllum panamense</i>	<i>Periclimenes infraspinis</i>
<i>Synalpheus apioceros sanjosei</i>	<i>Pontonia margarita</i>
<i>Synalpheus biunguiculatus</i>	<i>Processa</i> spp.
<i>Synalpheus digueti</i>	<i>Thor paschalis</i>
<i>Synalpheus nobili</i>	<i>Trachycaris restrictus</i>

Alpheus schmitti Chace, 1972

Material.—Punta Chile, Bay of Mazatlán, rocky shore, 2 specimens (Feb 1980).

Previous Eastern Pacific records.—The species is known only from this record.

Range.—Florida Keys, Antigua Island, Grenada, Tobago (Chace 1972); Mazatlán, Sinaloa.

Habitat.—Lower midlittoral zone, under stones.

Family Ogyrididae

Ogyrides sp.

Material.—Bay of Mazatlán, 58 specimens (Aug 1980–Apr 1981).

Previous Eastern Pacific records.—Southwestern Mexico (Wicksten in press).

Range.—Because of the uncertainty of the specific identity, the range is uncertain. Other specimens of *Ogyrides* have been taken in southwestern Mexico and off Southern California, U.S.A. There may be more than one species in the area.

Habitat.—In the Bay of Mazatlán, the species is common on soft bottoms.

Discussion

At least 29 species of carideans including a least two species of *Processa* and one or more species of *Ogyrides*, are known now from the coast of Sinaloa. The fauna contains many wide-ranging species, some of which are known only from a few specimens.

Certain species are characteristic of different depths or habitats (Table 1). Those of the coastal estuaries and lagoons are particularly interesting, having been poorly studied elsewhere in western Mexico.

The caridean fauna of Mazatlán differs somewhat from that found in other parts of the Gulf of California. The small shrimp *Palaemon ritteri*, common at Guaymas and Puerto Peñasco, has not been taken at Mazatlán. *Thor paschalis* and *Hippolyte williamsi*, common elsewhere among *Sargassum* spp., also are uncommon or not reported from the area. Perhaps the degree of exposure to waves or the

temperature of the water may be responsible for the difference in the caridean faunas.

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